Solutions 10000 version (Quarterly)

$n = 4$ (Quarterly)

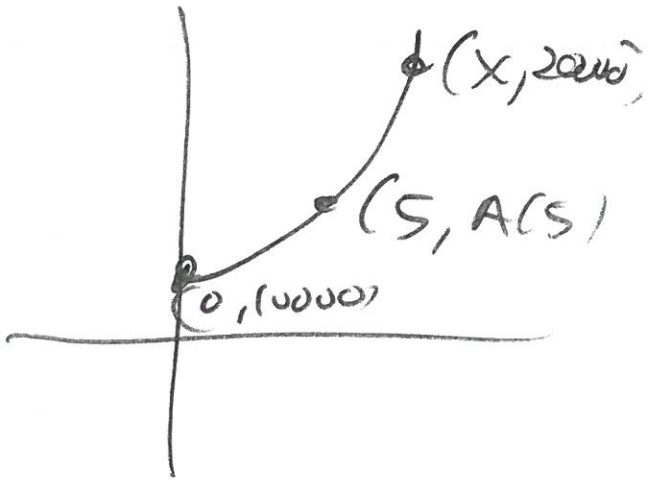
$P = 10000$

$r = 2.25\%$

$r = 0.0225$

$$A = 10000\left(1 + \frac{0.0225}{4}\right)^{4X}$$

model



$A(5) = 11187.20$ Balance after 5 years

Earnings after 5 years

$11187.20 - 10000$

$= 1187.20$

$$20000 = 10000\left(1 + \frac{0.0225}{4}\right)^{4X}$$

$$\frac{20000}{10000} = \frac{10000\left(1 + \frac{0.0225}{4}\right)^{4X}}{10000}$$

$$2 = \left(1 + \frac{0.0225}{4}\right)^{4X}$$

By Defn

$$\log_{\left(1 + \frac{0.0225}{4}\right)} 2 = 4X$$

$$X = \frac{\log_{\left(1 + \frac{0.0225}{4}\right)} 2}{4}$$

$$\approx 30.8931$$

Doubling time ↑

✓✓

$A(30.893) = 20000.00$

10000 Monthly Compounding

$P = 10000$

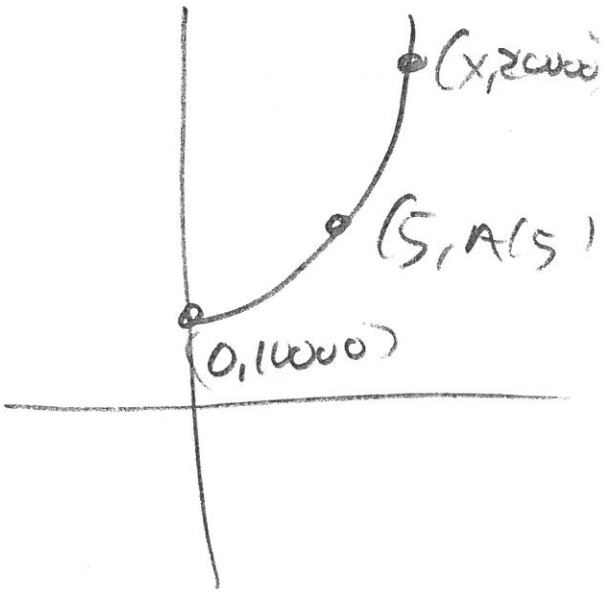
$r\% = 2.25\%$

$r = 0.0225$

$n = 12$ (monthly)

$$A(x) = 10000\left(1 + \frac{0.0225}{12}\right)^{12x}$$

Model



$A(5) = 11189.54$

Balance after 5 years

Earnings after 5 years

$11189.54 - 10000$

$\$1189.54$

$$20000 = 10000\left(1 + \frac{0.0225}{12}\right)^{12x}$$

$$\frac{20000}{10000} = \frac{10000\left(1 + \frac{0.0225}{12}\right)^{12x}}{10000}$$

$$2 = \left(1 + \frac{0.0225}{12}\right)^{12x}$$

By Doh

$$\log\left(1 + \frac{0.0225}{4}\right)^{2} = 12x$$

$$x = \frac{\log\left(1 + \frac{0.0225}{12}\right)^{2}}{12}$$

$$\approx 30.8354$$

$\checkmark\checkmark A(30.8354) = 19999.99$

Doubling time

10000 investment cts compounded

$P = 10000$

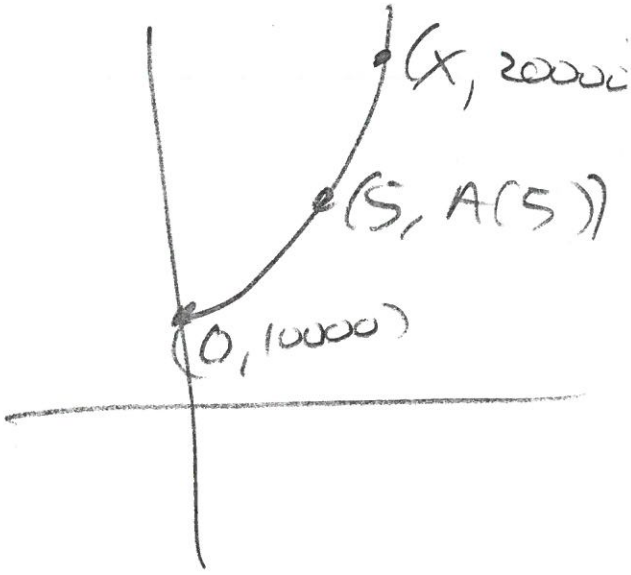
$r\% = 2.25\%$

$r = 0.0225$

$n =$ cts compounded

$$A(x) = 10000e^{0.0225x}$$

model



$A(5) = 11190.72$ ← Balance after 5 years

Earnings after 5 years

$11190.72 - 10000$

1190.72

$$20000 = 10000e^{0.0225x}$$

$$\frac{20000}{10000} = \frac{10000e^{0.0225x}}{10000}$$

$$2 = e^{0.0225x}$$

By Defn

$$\ln 2 = 0.0225x$$

$$x = \frac{\ln 2}{0.0225}$$

$$x \approx 30.8065$$

Doubling time

// $A(30.8065) = 19999.98$

Solutions

Given Model $A(x) = 45000 e^{0.053x}$

$P = 45000 \rightarrow$ principal

$r = 0.053 =$ rate as decimal

$(0.053)(100) = 5.3\%$ rate as percent

Cts compounded interest

$A(10) = 45000 e^{0.053(10)} \approx 76451.95$

Balance after 10 years

Earnings of 5000 $\rightarrow$ $45000 + 5000 = A(x)$

$\rightarrow$ $50000 = A(x)$

$$50000 = 45000 e^{0.053x}$$

$$\frac{50000}{45000} = \frac{45000 e^{0.053x}}{45000}$$

$$\frac{50000}{45000} = e^{0.053x}$$

By Defn $\ln\left(\frac{50000}{45000}\right) = \ln\left(\frac{10}{9}\right) = 0.053x$

$$x = \frac{\ln\left(\frac{50000}{45000}\right)}{} = 1.988 \text{ yrs}$$

What rate to invest P. dollars

$A(18) = 500000$

$P = 50000$

$n = cts$

$r = ?$

$$500000 = 50000 e^{r(18)}$$

$$\frac{500000}{50000} = \frac{50000 e^{18r}}{50000}$$

$$10 = e^{18r}$$

By Def

$$\ln 10 = 18r$$

$$\boxed{r = \frac{\ln 10}{18}} \approx 0.1279 \approx 12.79\%$$

↓ exact "r"

↑ approx as decimal

↑ r as %

$$\checkmark\checkmark \quad A(18) = 50000\left(e^{0.1279(18)}\right)$$

$$\approx 499807.49$$